(1500 m). Three other densely pubescent *Argophylli* occur near *A. phoenix*: *A. coccineus* Brandg., *A. funereus* Jones, and *A. purshii* var. *tinctus* Jones. The first of these has in common with *A. phoenix* persistent petioles and coarse pubescence, but has more numerous and longer red flowers elevated on long peduncles. The other two have finer, cottony pubescence, soft petioles, and three or more flowers borne together, again on developed scapes. The pod of the nearly sympatric *A. funerus* is much larger, 3—5 not 2 cm long; that of *A. purshii* var. *tinctus* is in the same size-range as that of *A. phoenix,* but the whole appearance of the plant is quite different.

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NOTES ON LOEFLINGIA (CAROPHYLLACEAE)

R. C. Barneby and Ernest C. Twisselmann

Introduction

The small caryophyllaceous genus *Loeflingia* is of interest to plant geographers because of its bicentric dispersal. In the Old World its center of abundance coincides with the western end of the Mediterranean basin, with greatest concentration of variability and of numbers in the southern and eastern quarters of the Iberian Peninsula and in northern Morocco and Algeria. In Africa it extends south into the Sahara, but from the Mediterranean coast eastward from the longitude of Malta there are only a few scattered records of the common species, *L. hispanica* L. In the Old World, *Loeflingia* is clearly a west-Mediterranean type. The range of the genus in North America is less extensive but more discontinuous. Representatives occupy four well defined floristic provinces, one east and three west of the Continental Divide: 1, east-central Texas north, interruptedly, to western Nebraska; 2) floor of the Sonoran Desert in southern Arizona and northern Sonora; 3, the Basin and Range sagebrush deserts of northeastern California, southeastern Oregon, and southwestern Wyoming; and 4, cismontane California southward from Santa Cruz and Stanislaus counties into northern Baja California. Wherever they occur, the loeflingias are associated with light, often disturbed or wind-modified, commonly sandy soils, and show marked tolerance or even preference for genuine dune habitats. They appear intolerant of competition and tend to occupy microhabitats in which most plants have difficulty in taking foothold.

It was early suggested by Hooker (1840) and by Brandegee (1890) that *Loeflingia* might not be native to America, but this view is untenable. Variation in our plants is plainly correlated with familiar dis-

persal patterns, a situation that could not be expected of immigrant weeds. Furthermore the Old World loeflingias differ from ours in having at once smaller capsules, larger petals, and longer styles; and although the mode of branching is alike everywhere in basic design there are differences in ratio of the main internodes to length (and density) of the monochasial cymes beyond the initial dichotomies of the stem that give the North American and Mediterranean plants a subtly different aspect. However, as Hooker remarked (1840), when he described *L. texana,* the species are so similar in general organization that a case could be made for treating all as races of the original *L. hispanica.*

While the generic range of *Leoflingia* is probably now well worked out in broad outline (if not yet in fine detail), the taxonomy remains in a fluid state. Comparison of two recent accounts of the Old World species (Maire, 1963; Heywood, 1964) and of the modern floras covering the Intermountain United States and Sonoran Desert in America make this very clear. Our interest in the Mediterranean species is aroused by the similarity of the problems presented by *Leoflingia* in its two main areas of dispersal, but we lack the material to pursue it. The objectives of this study are to determine: a, the nature, and the relationship to *L. squarrosa* Nutt., of the long known but mysteriously local *L. pusilla* Curran, reported only from Kern Co., California; and b) the identity of the loeflingias found in the Sonoran Desert, and of similar plants encountered in widely scattered stations in the Intermountain region northward. Along the way we have been obliged to reexamine all the North American species.

History of Loeflingia in America

The *Loeflingia* first described from America was *L. squarrosa* (Torrey and Gray, 1838–1840), based on a plant collected by Nuttall near San Diego, California, in 1836. The genus had actually been discovered slightly earlier, in 1833 or 1834, by Drummond in Texas. Hooker (1840) described and figured Drummond's plant as *L. texana,* a proposition promptly reduced by Torrey and Gray (1838–1840) to *L. squarrosa.* Matters rested there until Mary K. Curran (Katharine Brandegee) (1885) described *L. pusilla* from plants collected the previous summer along the railroad west of Tehachapi. This was said to differ from *L. squarrosa* in being "much more delicate" and inferentially in its short, straight, entire sepals; it was further noted as pentandrous and apetalous. The only other described American species, *L. verna* Nelson, is *Arenaria pusilla* Wats. (*Loeflingia verna* Nelson, Bot. Gaz. (Crawfordsville) 54:138. 1912, "Secured by Macbride . . . near New Plymouth, [Idaho], April 24, 1911, no. 773.", DS!, RM!—hototype).

Systematic literature dealing with the genus in America is meager. It appeared in Gray's *Genera* (1849) where *L. texana* is illustrated

under the name *L. squarrosa*. Robinson (1893) furnished a key to the three described species, distinguishing *L. pusilla* from the rest by its toothless outer sepals and separating *L. squarrosa* from *L. texana* by supposedly smaller stature, less secund branching, recurving sepals, and oblong-elliptic rather than obovate seeds. According to Robinson all *Loeflingia* in the New World should be triandrous, in contradiction to the protologues of *L. squarrosa* and *L. pusilla* and to Gray's account of the genus just mentioned. This point has long been in dispute. Brandegee (1890) had already remarked that the flower of *L. pusilla* was triandrous, although this is untrue of the one individual plant known to survive out of the type-collection. We now know of apparently constant pentandrous populations, of pentandrous individuals in largely triandrous populations, and of individual flowers varying in number of stamens on a single plant.

During the present century it has been customary to follow Robinson in maintaining *L. squarrosa* and *L. texana* as distinct species, but their ranges are so well separated that no occasion has arisen to compare them critically. With the few exceptions mentioned directly, *L. squarrosa* has been treated as endemic to cismontane Califorina or at least to the California floristic province. Peck (1941) extended the range of *L. squarrosa* to interior Oregon in Harney Co. Its presence in Arizona was confirmed by Kearney and Peebles (1942). However, Shreve and Wiggins (1964) subsequently referred the Arizona plant to *L. texana,* a species not recorded otherwise from west of the Divide. In floras that cover all of California, Jepson (1914), Abrams (1944), and Munz (1959) agree that *L. pusilla* is known only from Tehachapi, and all published accounts of this species, up to a recent report by Twisselmann (1967) from the western Mojave Desert in Kern Co., go back to the type collection, for which no exact match has ever been encountered. Before presenting our views on the taxonomy, we propose to discuss briefly the comparatively few phenotypic characters that have been used or promise to prove useful in delimiting taxa.

Habit and Mode of Branching

Branching in *Loeflingia* is of two types, one preceding the other: strictly dichotomous, when the primary axis divides into two branches of equal vigor, usually containing a sessile flower in the fork; and monochasial, as one branch of the dichotomy becomes reduced or obsolete at several successive nodes. Dichotomy may start directly from the axils of the cotyledons, or beyond several internodes of a simple axis, and distally gives way, either abruptly or gradually, to a more or less pronounced monochasial mode. When the distal monochasia are well developed, they form fan-shaped sprays; when poorly developed, each may be reduced to a single flower and the inflorescence comes to simulate a spike. The position of the first dichotomy and the relative size

of the monochasia together determine the aspect of the plant, an aspect which is often characteristic of all members of a population and also tends to be dominant over large areas. We have developed no objective formula for describing the permutations of branching, but believe that the intangible quality of habit permits intuitive sorting of material into categories that coincide with comprehensible dispersal patterns. Stature of the individual plant is governed to some extent by variations in rainfall from year to year, as observed at several stations in Kern Co. On the other hand maximum or potential stature is to some degree genetically controlled, for none of the desert loeflingias, however favorable the season, seem ever to surpass three centimeters in height.

Flowers

The flowers of *Loeflingia,* at least in America, are cleistogamous. The five sepals, the two outermost of which are often leaflike in form and are perceived as sepals through their position and (occasionally) by being accompanied by an opposed stamen, connive over the ovary throughout anthesis. The three, four, or five filaments are closely contained between the sepals and the ovary and the filaments are exactly long enough to elevate the minute anthers to the level of the (in America subsessile) stigmas. Pollination is automatic, and ordinarily (disregarding some terminal buds which never reach maturity) is 100% effective, for it is rare indeed to find on any plant a single infertile flower. Obligate autogamy gives rise to internal homogeneous populations which, immune to the leveling effects of outcrossing, hand on intact an indefinitely reduplicated genetic structure. The resulting phenetic uniformity of populations has tended to elevate the apparent taxonomic value of minor characters and permits the elaborate but, we suspect, artificial heirarchy of subspecies and formae worked out by Maire (1963) for *L. hispanica* sens. lat. in North Africa. In America few such characters find uniform expression over any considerable land area, and there is only limited correlation between any pair of them. The reduced flower of *Leoflingia,* commonly apetalous in the American forms or with petals represented by vestigial and somewhat amorphous scales, presents few taxonomic features: length and curvature of sepals; presence of lateral teeth on 2 or more sepals; and stamen number.

Within populations as represented by herbarium specimens we have seen little variation in length of the outer sepals, which are, however, normally longer than the three inner ones. The variation between populations is marked. In cismontane California the longest sepal of *L. squarrosa* sens. str. varies from approximately 3 to 6 mm in length, that is from a trifle longer to twice as long as the capsule. The curvature of the sepal seems largely a function of its length, modified by age. Sepals nearly straight in bud become squarrose as the fruit ripens, but curvature occurs mainly in the part projecting beyond the capsule. It fol-

lows that the longer the sepal the greater the curvature. Length and curvature of the sepals seem to bear some relation to geographic dispersal but are poorly linked with other morphological characters and we believe that they have been overestimated as taxonomic criteria.

A filamentous or setiform tooth or spur arising on each side of at least the two outermost sepals is a generic character of *Loeflingia*. The tooth appears homologous with what is generally interpreted, in the cauline leaves, as the free tip of a partially adnate stipule. Rare individuals that lack all such appendages become technically indistinguishable from *Minuartia*. The sepal teeth vary considerably in length and stoutness, and the stipules vary with them, suggesting that they are under the control of the same gene or genes. In America the outer sepals are nearly always appendaged, the three inner ones very rarely so. Usually the toothed outer pair do not subtend a functional stamen and then, because they are not only longer than the three inner but also entirely leaflike in shape and texture, they simulate bracts enclosing a trimerous flower. Occasionally, however, the presence of an opposed stamen reveals the sepaloid nature of the outer pair. In those rare instances where the sepal teeth are obsolete, and the outer pair of sepals become obviously sepaloid and unleaflike, the flower becomes pentandrous. Thus the passage from true leaf into segment of the perianth is not marked by the usual discontinuity. We have learned to regard the presence of teeth on 2, 3, or 5 sepals and the occasional absence of teeth from all sepals as in the nature of individual variation, linked neither with geography nor with other characters. On the other hand the longer and stiffer setae on both leaves and sepals of the Texan loeflingias contribute materially toward the distinct facies of the populations east of the Continental Divide.

We have noted the correlation between a pentandrous flower and sepaloid sepals and between a triandrous flower and a pair of foliaceous, toothed exterior sepals. The latter combination is far the commoner everywhere in America, universal (so far as we have observed) east of the Divide. In cismontane California we find only sporadic instances of more than three stamens, and these sometimes occur on the same plant with triandrous flowers, for example, Los Angeles Co., Newhall, *Pringle,* NY; San Diego, *Orcutt,* NY; the condition described by Torrey and Gray for the original *L. squarrosa* though since denied. In the Intermountain region there are populations fully pentandrous (*Ripley & Barneby 7938,* CAS, NY), partly triandrous and partly pentandrous (Honey Lake, *Brandegee,* UC), and wholly, so far as sampled, triandrous, but no correlation with other phenetic characters has been discovered. Probably all loeflngias are primarily triandrous but retain a latent potentiality for return to what is presumably the primitive pentandrous condition.

Capsule and Seed

West of the Sierra crest in California the capsule of *Loeflingia* is narrowly ovate to lanceolate in profile, with width-length ratio of approximately 1:3–4. All capsules of drought-inhibited individuals and late capsules of vigorous plants tend to be smaller than average but no wider proportionately. On the deserts and east of the Divide the capsule is ovate in profile, with width-length ratio of 1:2–2.5. In both areas some capsules lie inconveniently in the ratio of 1:2.5–3, but these are generally longer absolutely if from west of the Sierra, absolutely shorter if from the east. There is no abrupt discontinuity, but nevertheless we have found the capsule-outline more helpful than any other character in delimiting typical *L. squarrosa*. As shown below, it was crucial in our disposition of the litigious *L. pusilla*.

Robinson (1893) was the first to notice differences in size and outline of the seeds of *L. texana* and *L. squarrosa,* the former being shorter and plumper. Within a given capsule the seeds are virtually uniform in size, and within the population the difference, if any, is barely perceptible. Seeds of cismontane California *Loeflingia* are 0.4–0.5 mm, rarely up to 0.55 mm long; of *L. texana* 0.3–0.4 mm long. In the Sonoran Desert the seeds fall within the size-range of *L. texana;* in the Intermountain region within that of *L. squarrosa*. In conjunction, the capsule and seeds, as so often in Caryophyllaceae, furnish useful, even though not infallible taxonomic criteria.

Conclusions

When Robinson contrasted a Californian *L. squarrosa* characterized by long, recurved sepals and relatively long seeds with a Texan *L. texana* differing in its relatively straight sepals and short, plump seeds, he had for comparison no material at all from intervening territories and only a few specimens even from California. Plants collected since his day, especially on the deserts, have effectively blurred the supposed morphological discontinuity between the loeflingias of the Pacific and Atlantic slopes. The Arizona plants, which have been referred because of their recurving sepals to *L. squarrosa* and alternatively because of their small seeds to *L. texana,* are neatly intermediate in terms of Robinson's criteria. They lean somewhat to *L. texana* in their relatively stiff and long sepal teeth, but differ greatly in their diminutive stature and their habit of dense dichotomous branching which starts from the cotyledons or from the first node. This growth habit is equally alien to *L. squarrosa* and *L. texana,* but is nearly duplicated in the loeflingias found in the Intermountain region to the north. The latter, now known from five mutually remote areas of small extent, three in transmontane California, one in southeastern Oregon, and one in southwestern Wyoming, have characteristically short, straight sepals combined with the seeds of

L. squarrosa in the capsule of *L. texana*. Because of overlapping and recombination of the available criteria in these four geographic provinces we believe the American loeflingias are reasonably interpreted as a single species, *L. squarrosa,* composed of four subspecies.

KEY TO THE SUBSPECIES OF L. SQUARROSA NUTT. IN TORR. & GRAY

Capsule narrowly ovate to lanceolate in profile, (2.5)2.7–3.7 mm long, 0.8–1 mm in diameter, the width-length ratio mostly 1:3–4; stems usually 3–10 cm long, shorter only in depauperate individuals or in populations dwarfed by drought; primary stem axis usually simple through 2–3 internodes, the first flower borne at a point 5 mm or more distant from the cotyledons (this character fallible especially in drought inhibited plants); distal monochasia mostly 1-flowered; stipules and sepal teeth weak, short, filamentous, usually less than 1 mm long; sepals variable in length, the longest 3–6 mm long, slightly longer to twice as long as the capsule, when long becoming squarrose in age; cismontane California southward from Stanislaus and Santa Cruz counties to northern Baja California, and one locality on the western Mojave Desert in Kern Co., where sympatric but not intergrading with ssp. *artemisiarum*. . . . ssp. *squarrosa*

Capsule ovate in profile, (1.5)1.8–2.5(2.7) mm long, (0.7)0.8–1.2 mm in diameter, the width-length ratio mostly 1:2–2.7(3); east of the crests of the Sierra Nevada in California, to Wyoming, Nebraska, Texas, and Sonora.

Diminutive plants, stems to 3 cm long, often less, mostly dichotomous from the cotyledons or from the first succeeding node, the first flower borne at a point only 1–4(5) mm distant from the cotyledons; monochasia distal to the dichotomies all reduced to one flower; seeds, sepals, and stipular setae various; Intermountain states and Sonoran Desert.

Seeds 0.4–0.5 mm long; sepals always short, 1.8–4 mm long, not or little recurved at tip; stipular setae and sepal teeth weak, filamentous, less than 1 mm long (as in ssp. *squarrosa*); Intermountain United States, southwestern Wyoming to southeastern Oregon and northeastern California, and on the western Mojave Desert in Kern and Inyo counties, California . . . . . ssp. *artemisiarum*

Seeds 0.3–0.4 mm long; sepals mostly to 3.5–5 mm long, squarrose; stipular setae and sepal teeth intermediate in length and rigidity between those of ssp. *squarrosa* and ssp. *texana;* Sonoran Desert, from south central Arizona to northern Sonora. . . . . ssp. *cactorum*

Taller plants, the stems, unless depauperate, 4–15 cm long, bearing the first flower at points at least 5 mm from the cotyledons, following several simple internodes; monochasia distal to the dichotomies more than 1-flowered, tending to form scorpioid cymes; seeds small, 0.3–0.4 cm long; stipular setae and sepal teeth stiff, subspinose, 1–1.5 mm long; east central Texas northward interruptedly to western Nebraska . . . . . ssp. *texana*

LOEFLINGA SQUARROSA Nutt. in Torr. & Gray ssp. SQUARROSA, Fl. N. Amer. 1:174. 1838, "Sandy plains, St. Diego, California . . . *Nuttall.*", NY!—isotype. *L. pusilla* Curran, Bull. Calif. Acad. Sci. 1:152. 1885, "Tehachapi, Alt. 4,000 feet, May.", UC!—isotype labelled: "Bet. Tehachapi and Girard Station (now Marcel), along the railway, May, 1884. Pt of type, K.B." The holotype collected in 1884 by M. K. Curran was not found at CAS and was probably destroyed.

Thin sandy and gravelly soils, mostly below 2000 ft, sometimes in dry stream-beds, in abandoned fields, waysides, and dunes, South Coast

Ranges of California inland from the ocean from Santa Cruz to Santa Barbara Co.; margins of San Joaquin Valley and Sierra foothills from Stanislaus to Kern Co., there ascending through the Digger Pine belt to about 3900 ft; thence south through coastal and interior southern California to San Bernardino Valley and western San Diego Co.; and reportedly (Brandegee, 1890) to lat N. 28° in Baja California; and in Kern Co. at 2450 ft on stabilized dunes around Buckhorn Dry Lake in the western Mojave Desert, there sympatric with ssp. *artemisiarum*.

Representative specimens. California: *Hoover 5130,* NY, UC; *Keck & Stockwell 3354,* DS; *Twisselmann 2008, 2856, 8489, 13016,* all CAS; *Brandegee,* in 1909, CAS, DS, UC; *Howell 5814, 29243,* all CAS; *Howell & Barneby 29424,* CAS; *Parish 4158,* NY, UC; *Brandegee,* in 1898, NY, UC.

Disposition of L. pusilla

We have already noted that until 1967 all records in the literature of *L. pusilla* are based on the type collection, which to date has never been precisely matched. The holotype was presumably part of the California Academy collection lost in the San Francisco fire in 1906. A single individual that survived labelled as authentic by K. Brandegee (UC) and agrees perfectly with the protologue, up to the last detail of toothless sepals and pentandrous flowers. We surmise that this specimen and *T. S. Brandegee* s. n., 23 June 1892 (UC), from Honey Lake, California furnished the model for Abrams's Fig. 1718 (1944), of which the only fault is that the capsule is enlarged twice as much as that of *L. squarrosa* in Fig. 1717, thereby giving a false impression of the proportionate differences. Repeated search around Tehachapi has yielded nothing quite like *L. pusilla,* although ssp. *squarrosa* was collected as early as 1909 by Brandegee at Keene, close to the type locality. Because the type of *L. pusilla* was collected along the railroad we cannot discount the possibility that it was a waif: but if waif it was, its origin will remain obscure until it can be matched with some naturally occurring population. We can affirm, in any case, that *L. pusilla* is not an introduced form or race of *L. hispanica*. It can be accommodated without severe strain in our concept of *L. squarrosa* because, although it possesses a unique combination of characters, some of them uncommon in the species, it has no character unique to itself. The only outstanding question is whether to refer it to the cismontane or transmontane Californian subspecies of *L. squarrosa*.

The unique character combinations in *L. pusilla* are: a, small stature, to 5 cm; b, dichotomies and flowers starting only 2 mm from the cotyledons; c, distal monochasia more than 1-flowered; d, obsolete or vestigial stipule tips and sepal teeth; e, sepals all short, 3–3.5 mm; f, 5 stamens; g, slenderly ovoid capsule (± 3 X 1 mm), and h, relatively large seeds, between 0.5 and 0.55 mm. Of these characters a is easily

matched in cismontane ssp. *squarrosa,* especially in dry years; the plant is not "much more delicate" than many modern collections from the Coast Ranges, but is taller than any known individual of ssp. *artemisiarum*. Characters c and g are normal for ssp. *squarrosa,* alien to ssp. *artemisiarum,* and g (slender capsule) is in our opinion one of the best diagnostic features of the former. Characters b, e, and f, are all known to occur in ssp. *squarrosa,* but only exceptionally, and elsewhere not together; only b and e are characteristic of ssp. *artemisiarum;* f is sporadic in both. Character h, common to ssp. *artemisiarum* and ssp. *squarrosa* serves only to exclude *L. pusilla* decisively from the more eastern races of the species (either of which *could* have been adventive at Tehachapi). Character d has been seen in only one other *Loeflingia,* Brandegee's collection of ssp. *artemisiarum* from Honey Lake. We have already suggested that loss of setae is an individual variation of no systematic importance. Thus we are led to believe that the type of *L. pusilla* was an unusual variant of ssp. *squarrosa* in which several rare features are combined. The plants cited as *L. pusilla* by Twisselmann (1967) from the western Mojave Desert in Kern Co. are now interpreted as *L. squarrosa* ssp. *artemisiarum*. The dunes around Buckhorn Lake are the only station in which two subspecies of *L. squarrosa* are known to grow together. Twisselmann (1967) has already observed that in this locality the two seem to have slightly different ecological preferences, the ssp. *artemisiarum* favoring the stiffer, more alkaline soils.

Loeflingia squarrosa Nutt. in Torr. & Gray ssp. **artemisiarum** Barneby & Twisselmann, ssp. nov. Habitu pumilo ssp. *cactorum* simulans sed imprimis seminibus majusculis (0.4–0.5 mm longis) iis ssp. *squarrosae* aequimagnis sepalis sesmper abbreviatis rectis capsulam paullo superantibus absimilis, a ssp. *squarrosa* fere toto allopatrica praeertim statura semper minima atque capsula latius ovoidea breviori recedens.

Type. Oregon: Harney Co., sandy flats 3 miles south of Wright's Point, June 24, 1942, *Morton E. Peck 21370,* NY!, CAS!—holotype.

Dunes and sandy flats, often among sagebrush, mostly between 4000 and 7000 feet, northeastern California (Lassen and Plumas counties) and southeastern Oregon (Harney Co.), to be sought in northern Nevada; southwestern Wyoming (upper Green River Valley in Sweetwater Co.); also in Owens Valley in Inyo Co. and at approximately 2450 ft. around Buckhorn, Rogers, and Rosamond dry lakes on the western Mojave Desert in southeastern Kern and adjacent Los Angeles counties, California (there sometimes associated with ssp. *squarrosa*).

Specimens examined. Wyoming: Sweetwater Co., 26 miles east of Farson, *Ripley & Barneby 7938,* CAS, NY. Oregon: Harney Co., French Glen, *Peck 21419,* CAS; 8 miles north of Narrows, *Ripley & Barneby 6086,* CAS. California: Lassen Co., Honey Lake, *Brandegee,* UC; Plumas

Co., 5.8 miles east of Beckwourth, *Howell,* CAS; Inyo Co., near Bigpine, *Twisselmann 15537,* CAS, NY, RSA; Kern Co., Buckhorn Dry Lake, *Twisselmann 10777, 10838,* both CAS; between Old Pancho Barnes place and Buckhorn Dry Lake, *Twisselmann, McMillan, & Smith 14227,* CAS, NY; south end of Rogers Dry Lake, *Twisselmann 10714,* CAS; Los Angeles Co., 5 miles north of Lancaster, *Hoffmann,* SBM.

Loeflingia squarrosa Nutt. in Torr. & Gray ssp. **cactorum** Barneby & Twisselmann, ssp. nov. Habitu deminuto, caulibus ex ipso basi simul dichotomis ac florigeris ssp. *artemisiarum* proxima sed sepalis elongatis demum recurvis et praesertim seminibus minoribus 0.3–0.4 mm longis iis ssp. *texanae* aequimagnis absimilis. A ssp. *squarrosa* necnon ssp. *texana* statura minima, habitu, monochasiis superioribus l-floris, ulterius ab illa seminibus parvis recedens, ab omnibus affinibus deserto Sonorensi incola allopatrica.

Type. Arizona: Pima Co., Sabino Canyon, Santa Catalina Mountains, *J. J. Thornber 5340,* Mar. 26, 1905, CAS!, DS!, NY!—holotype.

Sandy and gravelly desert flats, sometimes in hard-packed soil of ridges and adobe flood plains, below 3300 ft; south central Arizona in Pima Co., and in Pinal and Maricopa counties according to Kearney and Peebles (1951); and in the districts of Altar, Magdalena, and Hermosillo in Sonora.

Specimens examined. Arizona: Pima Co., 16 miles north of Tucson, *Abrams 13100,* DS. Sonora: 15 miles north of Magdalena, *Fosberg 7468,* DS; 7 miles south of Sasabe, *Keck 3970,* DS; 10 km northeast of San Pedro, east of Hermosillo, *Ripley 14333,* CAS, NY; north of Cumerol, *Abrams 13170,* DS.

Loeflingia squarrosa Nutt. in Torr. & Gray ssp. **texana** (Hook.) Barneby & Twisselmann, comb. nov. *L. texana* Hook., Icones plantarum 3: tab. 275. 1840, "Interior of Texas. Drummond (3d Coll. n. 464)", presumed isotype, *Drummond 464* (but "Coll. II"), NY!

Sandy soils below 2000 ft; east central Texas, the lower Colorado and Brazos valleys in Travis, Waller, and Colorado counties, and around Dallas and Fort Worth, Dallas and Tarrant counties; north central Oklahoma, the Cimarron Valley in Payne Co.; and greatly disjunct at about 3400 ft near the headwaters of the Niobrara River in Dawes Co., Nebraska.

Representative specimens. Texas: *Hall 480,* NY; *Wright 25,* NY; Reverchon distrib. *Curtiss 346,* NY; *Lundell 14031;* UC; *Shinners 14650,* CAS. Oklahoma: *Waterfall 13170,* CAS. Nebraska: *Webber,* in 1889, NY.

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UNUSUAL FACTORS CONTRIBUTING TO THE DESTRUCTION OF YOUNG GIANT SEQUOIAS

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During the summer of 1966, a stand of dead and dying 10- and 11-year-old giant sequoias, *Sequoiadendron giganteum,* was discovered in the Abbot Creek drainage of the Cherry Gap Grove of Sequoias in Sequoia National Forest. This grove is located immediately south of Converse Basin at 36°46′5″ N lat., and 118°56′49″W long.

This area was originally logged along with Converse Basin during the latter part of the last century. Although evidence is lacking, it is felt that the parent trees of the young sequoias in question were seeded at the time of logging. In 1955, this entire area was consumed by an intensely hot fire known locally as the "McGee Burn." The parent trees were killed by the fire, but disseminated the seeds which had apparently remained viable in the green cones after the fire.